

Space-Qualified 1064 nm Seed and Metrology Laser, Phase II

Completed Technology Project (2005 - 2007)



Project Introduction

Several instruments that are potential candidates for future space-based NASA missions require a highly stable, single frequency laser oscillator that is wavelength tunable. It should be a cw source with an output in the 10-100 mW range. Most of the applications either require that the wavelength be near 1064 nm or can use that wavelength. To meet many of the applications, the laser should have a short-term frequency drift of <1 MHz/min and a long-term frequency stability of ± 50 MHz. The more demanding applications require long term stability of ± 1 MHz. Some commercial lasers meet the less stringent performance requirements, but to our knowledge, Lightwave Electronics is the only domestic laser vendor that has built any space-qualified units. None of the commercial lasers meet the ± 1 MHz long term stability requirement. At this time no domestic laser manufacturers, including Lightwave Electronics, appear to be interested in supplying a laser that meets the ± 50 MHz long term stability requirement in a space-qualified version. We are proposing to build a space-qualified version of the required laser based on a design that is an innovative synthesis of microchip laser technology, space-qualifiable thermal control systems, frequency locking techniques that use a simple I2 absorption cell, and compact packaging technology. In addition to the basic cw laser development that was begun in Phase I, we are proposing to develop a next generation of compact control electronics. We are also proposing to demonstrate the utility of the system by using it to injection seed a Q-switched, 10 kHz repetition rate Nd:YAG laser oscillator. The required laser development strongly overlaps the technology development areas defined in the SBIR topic E1.02, Lidar Remote Sensing. The areas of overlap include the more specific categories of High Spectral Resolution Lidar systems, lidar for direct wind detection, and innovative laser component technologies.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

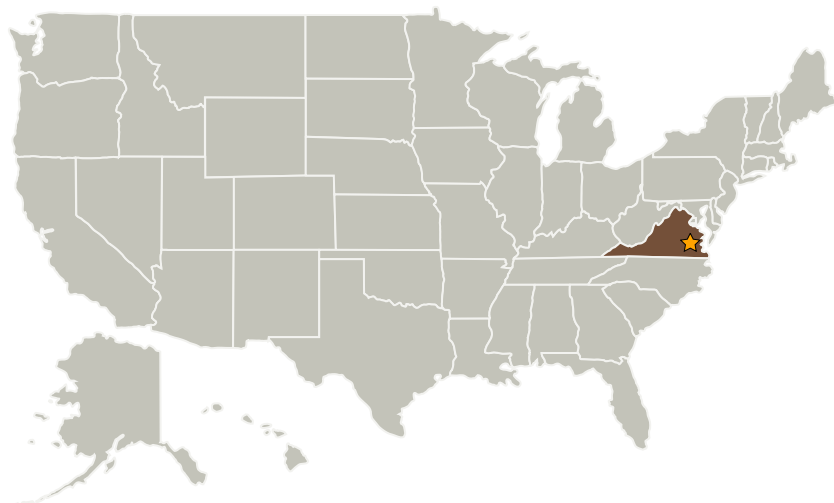
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Metis Technology Solutions, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Albuquerque, New Mexico

Primary U.S. Work Locations

Virginia